CBSE Class 10 Real Numbers: Important Questions and Solutions

Maths Standard (041) and Basic (241) · Board Exams 2027 · Questions and Answers Practice Sheet

Quick formulas: HCF × LCM = product of the two numbers (two numbers only) · For co-prime numbers HCF = 1 and LCM = product · HCF uses the smallest power of each common prime; LCM uses the greatest power of every prime · Proof by contradiction: assume rational, write p/q in lowest terms, reach a contradiction.

1. Important Questions with Answers

A. Multiple-choice and one-mark questions

Q1. Write the prime factorisation of 3825.
Ans: $3825 = 3^2 \times 5^2 \times 17$

Q2. If HCF(a, b) = 12 and a × b = 1800, find LCM(a, b).
Ans: LCM = 1800 ÷ 12 = 150

Q3. What is the exponent of 2 in the prime factorisation of 144?
Ans: $144 = 2^4 \times 3^2$, so the exponent is 4

Q4. The number $5 - \sqrt{3}$ is: (a) rational (b) irrational (c) an integer (d) a natural number.
Ans: (b) irrational

Q5. The product $(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$ is: (a) irrational (b) 5 (c) 1 (d) 0.
Ans: (c) 1, a rational number

Q6. The smallest number divisible by 12, 15 and 20 is: (a) 30 (b) 60 (c) 120 (d) 180.
Ans: (b) 60

Q7. Find the HCF and LCM of 6 and 20.
Ans: HCF = 2, LCM = 60

Q8. Which of these is irrational: (a) $\sqrt{49}$ (b) $\sqrt{12}$ (c) 2.5 (d) 22/7?
Ans: (b) $\sqrt{12} = 2\sqrt{3}$

Q9. If $a = x^3y^2$ and $b = xy^3$ (x, y are primes), find HCF and LCM.
Ans: HCF = xy^2, LCM = x^3y^3

Q10. The product of two co-prime numbers is 391. What is their LCM?
Ans: 391, because for co-prime numbers LCM equals the product

B. Two-mark questions

Q11. Find the HCF and LCM of 26 and 91 using prime factorisation.
Ans: $26 = 2 \times 13$, $91 = 7 \times 13$. HCF = 13, LCM = $2 \times 7 \times 13 = 182$

Q12. Explain why $7 \times 11 \times 13 + 13$ is a composite number.
Ans: It equals $13(77 + 1) = 13 \times 78$, so it has factors other than 1 and itself

Q13. Explain why $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ is composite.
Ans: It equals $5(1008 + 1) = 5 \times 1009$, which has a factor other than 1 and itself

Q14. Can 6^n end with the digit 0 for any natural number n?
Ans: No. $6^n = 2^n \times 3^n$ has no factor 5, and a number ending in 0 must be divisible by 5

Q15. Two numbers are in the ratio 3 : 4 and their HCF is 9. Find their LCM.
Ans: Numbers are 27 and 36, so LCM = 108

Q16. Find the HCF and LCM of 12, 15 and 21.
Ans: $12 = 2^2 \times 3$, $15 = 3 \times 5$, $21 = 3 \times 7$. HCF = 3, LCM = $2^2 \times 3 \times 5 \times 7 = 420$

C. Three-mark questions

Q17. Prove that $\sqrt{5}$ is irrational.

Ans: Assume $\sqrt{5}$ is rational. Then $\sqrt{5} = p/q$, where p and q are integers, $q \neq 0$, and p, q are co-prime. Squaring: $5 = p^2/q^2$, so $p^2 = 5q^2$. So 5 divides p^2, hence 5 divides p. Write $p = 5m$. Then $25m^2 = 5q^2$, so $q^2 = 5m^2$. Now 5 divides q^2, hence 5 divides q. Both p and q are divisible by 5, which contradicts the assumption that they are co-prime. So $\sqrt{5}$ is irrational. ∎ (The same proof works for $\sqrt{2}$, $\sqrt{3}$ and $\sqrt{7}$; only the prime changes.)

Q18. Prove that $5 + 3\sqrt{2}$ is irrational, given that $\sqrt{2}$ is irrational.

Ans: Assume $5 + 3\sqrt{2} = a/b$ is rational ($b \neq 0$). Then $3\sqrt{2} = a/b - 5 = (a - 5b)/b$, so $\sqrt{2} = (a - 5b)/(3b)$, a ratio of integers. So $\sqrt{2}$ would be rational, contradicting the given fact. Hence $5 + 3\sqrt{2}$ is irrational. ∎

Q19. Find the HCF and LCM of 336 and 54.

Ans: $336 = 2^4 \times 3 \times 7$, $54 = 2 \times 3^3$. HCF = 6, LCM = 3024

Q20. Find the largest number that divides 398, 436 and 542 leaving remainders 7, 11 and 15 respectively.

Ans: Subtract the remainders: 391, 425, 527. $391 = 17 \times 23$, $425 = 5^2 \times 17$, $527 = 17 \times 31$. HCF = 17

Q21. Three bells toll at intervals of 9, 12 and 15 minutes. They toll together at 8:00 a.m. When will they next toll together?

Ans: LCM(9, 12, 15) = 180 minutes = 3 hours, so at 11:00 a.m.

Q22. Two runners take 16 and 24 minutes to complete a lap. After how many minutes will they meet again at the starting point?

Ans: LCM(16, 24) = 48 minutes, when the runners have finished 3 and 2 laps

D. Application and longer questions

Q23. Prove that $1/\sqrt{2}$ is irrational.

Ans: Suppose $1/\sqrt{2} = p/q$ is rational ($q \neq 0$). Then $\sqrt{2} = q/p$ would be rational, which contradicts the known fact that $\sqrt{2}$ is irrational. So $1/\sqrt{2}$ is irrational

Q24. Find the HCF of 65 and 117 and express it in the form $65m - 117$.

Ans: HCF = 13. Now $13 = 65m - 117$ gives $65m = 130$, so $m = 2$

Q25. An army contingent of 616 members marches behind a band of 32 members. Both groups must march in the same number of columns. What is the maximum number of columns?

Ans: HCF(616, 32) = 8 columns

Q26. A rectangular courtyard measures 18 m 72 cm by 13 m 20 cm. It is to be paved with square tiles of the same size. Find the largest possible tile and the least number of tiles.

Ans: 1872 cm and 1320 cm. $1872 = 2^4 \times 3^2 \times 13$ and $1320 = 2^3 \times 3 \times 5 \times 11$, so HCF $= 2^3 \times 3 = 24$. The largest tile has side 24 cm. Number of tiles $= (1872 \div 24) \times (1320 \div 24) = 78 \times 55 = 4290$

2. Previous Year Questions (CBSE Board)

Board papers are issued in several sets, so wording or numbers can differ slightly between sets. Check the official papers for exact text.

Q1. (2025, 1 mark) If HCF(98, 28) = m and LCM(98, 28) = n, then the value of $n - 7m$ is: (a) 0 (b) 28 (c) 98 (d) 198

Ans: $98 = 2 \times 7^2$, $28 = 2^2 \times 7$. HCF = 14 = m, LCM = 196 = n. $n - 7m = 196 - 98 = 98$. Answer: (c) 98

Q2. (2025, 1 mark, Assertion–Reason) Assertion (A): For any two natural numbers a and b, the HCF of a and b is a factor of their LCM. Reason (R): The HCF of any two natural numbers divides both the numbers.

Ans: Both are true. Since the HCF divides a, and a divides the LCM, the HCF divides the LCM too. So R explains A: option (a)

Q3. (2025, 2 marks) Find the smallest number that is divisible by both 644 and 462.
Ans: LCM(644, 462). $644 = 2^2 \times 7 \times 23$ and $462 = 2 \times 3 \times 7 \times 11$. LCM $= 2^2 \times 3 \times 7 \times 11 \times 23 = 21252$

Q4. (2025, 2 marks) Two numbers are in the ratio 4 : 5 and their HCF is 11. Find the LCM of the numbers.
Ans: Numbers are 4x and 5x with HCF x = 11, so 44 and 55. LCM = (44 × 55) ÷ 11 = 220

Q5. (2024, 1 mark) Given HCF(2520, 6600) = 40 and LCM(2520, 6600) = 252 × k, the value of k is: (a) 1650 (b) 1600 (c) 165 (d) 1625
Ans: Product = 16,632,000. LCM = 16,632,000 ÷ 40 = 415,800. 252k = 415,800, so k = 1650. Answer: (a)

Q6. (2024, 1 mark) The LCM of the three numbers 28, 44 and 132 is:
Ans: $28 = 2^2 \times 7$, $44 = 2^2 \times 11$, $132 = 2^2 \times 3 \times 11$. LCM $= 2^2 \times 3 \times 7 \times 11 = 924$

Q7. (2024, 2 marks) Show that 11 × 19 × 23 + 3 × 11 is not a prime number.
Ans: 11 × 19 × 23 + 3 × 11 = 11(437 + 3) = 11 × 440. It has factors other than 1 and itself, so it is composite

Q8. (2024, 3 marks) Prove that $6 - 4\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.
Ans: Assume $6 - 4\sqrt{5} = a/b$ is rational. Then $4\sqrt{5} = (6b - a)/b$, so $\sqrt{5} = (6b - a)/(4b)$, a rational number. This contradicts the given fact, so $6 - 4\sqrt{5}$ is irrational. ∎

Q9. (2023, 2 marks) Two numbers are in the ratio 2 : 3 and their LCM is 180. What is the HCF of these numbers?
Ans: Numbers are 2x and 3x. LCM = 6x = 180, so x = 30. HCF = x = 30

Q10. (2023, 3 marks) Prove that $\sqrt{5}$ is an irrational number.
Ans: See the proof under Important Question 17 above

Q11. (2023, 3 marks) Find, by prime factorisation, the LCM of 18180 and 7575. Also find their HCF.
Ans: $18180 = 2^2 \times 3^2 \times 5 \times 101$ and $7575 = 3 \times 5^2 \times 101$. HCF $= 3 \times 5 \times 101 = 1515$. LCM $= 2^2 \times 3^2 \times 5^2 \times 101 = 90900$. Check: 1515 × 90900 = 18180 × 7575

3. Competency-Based Questions

Case Study 1: The Cultural Fest

A school is organising rehearsals for its annual fest. There are 96 students in the choir, 144 in dance and 240 in drama. The teacher wants groups of equal size, and each group must have students from only one activity.

Q(i). Write the prime factorisation of 96. (1)
Ans: $96 = 2^5 \times 3$

Q(ii). Write the prime factorisation of 144 and 240. (1)
Ans: $144 = 2^4 \times 3^2$ and $240 = 2^4 \times 3 \times 5$

Q(iii). What is the largest possible size of each group? (1)
Ans: The HCF $= 2^4 \times 3 = 48$

Q(iv). How many groups will there be in all? (1)
Ans: 96/48 + 144/48 + 240/48 = 2 + 3 + 5 = 10

Case Study 2: The Traffic Signals

Three traffic signals at a busy junction change colour after 48 seconds, 72 seconds and 108 seconds respectively. They change together at exactly 8:00:00 a.m.

Q(i). Which concept helps you find when they change together again? (1)
Ans: The LCM

Q(ii). After how many seconds will they change together again? (1)
Ans: $48 = 2^4 \times 3$, $72 = 2^3 \times 3^2$, $108 = 2^2 \times 3^3$. LCM $= 2^4 \times 3^3 = 432$ seconds (7 minutes 12 seconds)

Q(iii). At what time will this next happen? (1)
Ans: 8:07:12 a.m.

Q(iv). How many more times will they change together in the next 1 hour after 8:00:00 a.m.? (1)
Ans: 1 hour = 3600 seconds. 3600 ÷ 432 ≈ 8.33, so 8 more times

Quick competency items

Q1. Assertion–Reason. Assertion (A): The HCF of 8 and 9 is 1 and their LCM is 72. Reason (R): For two co-prime numbers, the LCM is the product of the numbers. Choose: (a) both true and R explains A; (b) both true but R does not explain A; (c) A true, R false; (d) A false, R true.
Ans: 8 and 9 are co-prime, so HCF = 1 and LCM = 72. Both true and R explains A: option (a)

Q2. Spot the error. Riya says, "√2 and √8 are both irrational, so √2 × √8 must be irrational." Is she right? Justify.
Ans: Riya is wrong. √2 × √8 = √16 = 4, which is rational. The product of two irrational numbers can be rational

4. Model Questions (Practice Only)

These are practice questions written in board-exam style. They are not predicted or guaranteed board questions.

QM1. (1 mark) If HCF(a, b) = 9, LCM(a, b) = 90 and a = 18, find b.
Ans: HCF × LCM = a × b, so 9 × 90 = 18 × b, giving b = 45

QM2. (1 mark) Which of these is rational? (a) $2\sqrt{3}$ (b) $\sqrt{5} + 1$ (c) $(\sqrt{3} + 1)(\sqrt{3} - 1)$ (d) $3 - \sqrt{7}$
Ans: (c). $(\sqrt{3} + 1)(\sqrt{3} - 1) = 3 - 1 = 2$, which is rational

QM3. (1 mark, Assertion–Reason) Assertion (A): LCM of 12 and 18 is 36. Reason (R): LCM = (product of the numbers) ÷ HCF. Choose the correct option from (a) to (d) as above.
Ans: (a). $12 = 2^2 \times 3$, $18 = 2 \times 3^2$, LCM = 36, and 216 ÷ 6 = 36, so R explains A

QM4. (2 marks) Find the HCF and LCM of 120 and 144 by prime factorisation.
Ans: $120 = 2^3 \times 3 \times 5$ and $144 = 2^4 \times 3^2$. HCF = $2^3 \times 3 = 24$, LCM = $2^4 \times 3^2 \times 5 = 720$

QM5. (2 marks) Show that 13 × 19 × 17 + 17 is a composite number.
Ans: 13 × 19 × 17 + 17 = 17(247 + 1) = 17 × 248, so it is composite

QM6. (3 marks) Prove that 3 + √11 is irrational, given that √11 is irrational.
Ans: Assume 3 + √11 = a/b is rational. Then √11 = (a − 3b)/b is rational, contradicting the given fact. So 3 + √11 is irrational. ∎

QM7. (3 marks) Find the smallest four-digit number that is divisible by 12, 18 and 24.
Ans: LCM(12, 18, 24) = 72. 1000 ÷ 72 ≈ 13.89, so the next multiple is 14 × 72 = 1008

QM8. (3 marks) Find the greatest number that divides 245 and 1029, leaving remainder 5 in each case.
Ans: Subtract the remainder: 240 and 1024. $240 = 2^4 \times 3 \times 5$ and $1024 = 2^{10}$, so HCF = $2^4 = 16$

QM9. (5 marks, application) Three tanks hold 403 L, 434 L and 465 L of milk. Find the maximum capacity of a container that can measure the milk in each tank exactly, and the number of containers needed for each tank.
Ans: 403 = 13 × 31, 434 = 2 × 7 × 31, 465 = 3 × 5 × 31, so HCF = 31 L. Containers needed: 403/31 = 13, 434/31 = 14, 465/31 = 15